

27 (Twice Amended) A Ca-containing rust-resistant steel comprising Ca at a concentration of 0.0005 wt% or more, wherein the composition of oxide inclusions and sulfur concentration in said steel are controlled so that the equilibrium sulfur soluble amount (%S inc.) value of at least 80% of CaO-containing oxide inclusions having a particle diameter of 2 μm or larger is about 0.03 wt% or less, wherein said equilibrium sulfur soluble amount (%S inc.) value is determined in accordance with the following equation (1), including as its parameters the optical basicity calculated from the composition of said oxide inclusions, the casting temperature and the components forming the steel, such equation being

$$\log (\%S \text{ inc.}) = (21920 - 54640\Lambda)/T + 43.6\Lambda - 23.9 - \log [aO] + \log [\text{wt}\%S], \dots(1)$$

wherein

T represents the casting temperature (K) during the continuous casting process,

[wt%S] represents the concentration of S contained in said steel,

[aO] represents the oxygen activity of said molten steel at said casting temperature (T) during a continuous casting process, and

wherein during Al-deoxidation,

$$\log aO = (-64000/T + 20.57 - 2\log[\text{wt}\%Al] - 0.086 [\text{wt}\% Al] - 0.102 [\text{wt}\% Si]) / 3, \text{ and}$$

wherein during Ti-deoxidation,

$$\log aO = (-60709/T + 20.97 - 2\log[\text{wt}\%Ti] - 0.084 [\text{wt}\%Ti]) / 3,$$

and provided that, when Al and Ti are present in said steel, a smaller aO oxygen activity is provided,

wherein Λ represents the optical basicity of oxide inclusions according to equation (2)

$$\Lambda = 1.0 X (\text{CaO}) + 0.605 X (\text{Al}_2\text{O}_3) + 0.601 X (\text{TiO}_2) + 0.78 X (\text{MgO}) + 0.48 X (\text{SiO}_2) + 0.55 X (\text{Cr}_2\text{O}_3) + 0.59 X (\text{MnO})$$

and wherein

$X (\text{MmOn})$ represents the cation equivalent of the oxide present, according to the following equation (3):

$$X (\text{MmOn}) = n \times N (\text{MmOn}) / \Sigma (n \times N (\text{MmOn})), \quad \dots(3)$$

wherein

$N (\text{MmOn})$ represents the mol fraction of oxide present and

n represents the valence of oxygen contained in said oxide.

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